

REMARKS

Claims 1-18 and 21-25 are pending/ Claims 1-9, 16, 17 and 21 are under consideration. Claims 10-15, 18 and 22 stand withdrawn from consideration. Reconsideration is respectfully requested.

The present invention relates to a precipitated silica.

Claim Rejection, 35 USC 103

Claims 1-4, 6-9, 16, 17 and 19-21 stand rejected based on 35 USC 103(a) as obvious over Esch et al, U.S. Patent 5,846,506 in view of Boyer et al, U.S. Patent 5,935,543. This ground of rejection is respectfully traversed.

Applicants wish to emphasize an important understanding that must be given to precipitated silicas that are to be used as fillers in the preparation of rubber materials, particularly fillers that are to be used in the construction of tire treads, that has long been known to those of skill in the art, is described in Fultz et al, U. S. Patent 5,929,156 as follows:

It is well known that a single physical characteristic, such as surface area or particle size, does little to describe a silica product or to predict its behavior in a specific application. The mechanisms which govern how a particular silica product performs in a given end-use can be extraordinarily complex and are often not well understood; thus, linking one or even a few conventionally -measured silica product physical properties to particular end-use performance characteristics is extremely difficult and potentially misleading.

Accordingly, in the present case applicants have found that a particular precipitated silica having the particular surface area and other surface characteristics as described is uniquely exceptional in its ability to function as a reinforcing filler in tire tread formulations. Thus, the

different value ranges of BET, CTAB, DBP value, Sears value, moisture level and Sears value/BET ratio are distinctive in describing a successful precipitated filler for tire tread formulations.

More particularly, with respect to the rejection based on the Esch et al patent, applicants' maintain their previously expressed comments as to how the characteristics of the present silica distinguish the silica over the silica of Esch et al. Since precipitated silicas always have silanol groups on their surfaces, the greater the surface area of a silica, the greater the absolute number of the silanol groups. The absolute number of the silanol groups is expressed in terms of the Sears value V_2 . Again, the discovery of the present invention is that for the first time, applicants have been successful in increasing the number of silanol groups on a given surface area of a precipitated silica. Stated in other terms, the silica of the present invention, while having a BET surface area which is identical to embodiments of known precipitated silicas, have a higher absolute number of silanol groups. In order to eliminate the effect of the surface area of a silica on the silanol number, the ratio of the absolute number of silanol groups to the BET surface area is taken and a normalized, relative group density of silanol groups is obtained. This normalized number is present in the claims of the invention and is a value of 0.150 to 0.280 ml/(5m²).

As stated previously, the silanol groups react with appropriate groups on a coupling reagent while another portion of the coupling molecule reacts with the rubber matrix material, thereby achieving bonding of the silica to the rubber matrix. The greater the number of silanol groups, the greater the degree of coupling between the silica and the coupling reagent. This greater degree of coupling increases the bonding of the silica particles to the rubber matrix, thereby resulting in a greater reinforcement potential.

The Examiner states on pages 3 and 4 of her Action that the ratio of Sears No. to BET surface area of the Esch et al patent falls within the claimed range of the corresponding ratio

range in present Claim 1. While this is true, the extent of overlap of 5 ml (6 to 20 ml in Esch et al versus 15 to 28 ml in the present claims) is small to begin with. Thus, it is constructive to consider the specific Sears No. values taught in Examples 1 and 2 of the '506 patent. In Ex 1 the Sears value is 9.0 ml which is well outside the presently claimed range of 15 to 28 ml. Not only that, but the BET surface area of $80 \text{ m}^2/\text{g}$ and the CTAB surface area of $75 \text{ m}^2/\text{g}$ are each below the corresponding minimum value of $100 \text{ m}^2/\text{g}$ for each of the two surface areas. In the case of Ex 2, the Sears No. value at 9.1 ml is even further away from the minimum range value of 15 ml of the present claims, although the BET and CTAB values of $120 \text{ m}^2/\text{g}$ (BET) and $115 \text{ m}^2/\text{g}$ slightly overlap with the claimed ranges in the present claims. Clearly, the specific Sears No. values determined of specific operable Examples 1 and 2 in Esch et al do not lead the skilled artisan to attempt to specifically alter how a given precipitated silica is prepared so that it has a Sears No value that falls within the relatively elevated range of Sears No. values of the present claims. Moreover, even if such motivation were provided, what confidence exists that the BET and CTAB values obtained would fall within the claimed ranges of the present invention? As to Example 3 which describes a silica having a BET value of $184 \text{ m}^2/\text{g}$, a CTAB value of $165 \text{ m}^2/\text{g}$ and a Sears No. of 15.7 ml, there is nothing in the example to suggest that a product within the scope of the present invention. Further, note that the normalized Sears value is 0.085 which is significantly below the minimum value of the range at $0.150 \text{ ml}/(5 \text{ m}^2)$ of the present claims. Thus, the silicas of Esch et al are characterized by much fewer OH groups per square meter of surface area. Thus, the silica of Esch et al is not that of the present invention.

Additional improved effects of the invention are an improved dispersion behavior and vulcanization times (see page 4, lines 15-17 of the text), and data from page 39, line 19 to page 40, line 3 and page 44, lines 3 to 14). The reference example in Table 2.5 on page 40 of the text, where the composition contains Ultrasil 3370 GR, is Example 3 of the Esch et al

patent. Thus, a direct comparison of the reference with Example 2.2 of the present invention is provided.

Applicants maintain that the previously submitted declaration is instructive of a point of distinction between the silica product of Esch et al and that of the present invention. For all the reasons stated, applicants maintain that the patent does not motivate the skilled artisan to significantly modify the technology of the patent in order to arrive at the present precipitated silica .

The deficiencies of Esch et al are neither overcome nor improved upon by Boyer for the reason previously stated of record. Accordingly, withdrawal of the rejection is respectfully requested.

Claims 1-9, 16, 17 and 21 stand rejected based on 35 USC 103(a) as obvious over Uhrlandt et al, U.S. Patent 6,180,076 in view of Boyer et al, U.S. Patent 5,935,543. This ground of rejection is respectfully traversed.

The comments as presented above with respect to the combination of Esch et al and Boyer et al apply equally as well to the combination of Uhrlandt et al and Boyer et al. Withdrawal of the rejection is respectfully requested.

Obviousness-type Double Patenting

The obviousness-type double patenting rejection is a provisional rejection. Accordingly, applicants will take appropriate action in the case upon the indication of allowable subject matter in either case.

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It is believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon

Customer Number

22850

Tel: (703) 413-3000
Fax: (703) 413-2220



Frederick D. Vastine
Registration No. 27,013